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The economic emergence of nations: Lessons from the catch-up countries and model for Senegal

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Abstract
The transition from a less advanced economy to a convergent economy is a subject that intrigues economists and, which they are trying to find explanations. This interest becomes more apparent when some developing countries are making this transition while other countries cannot start the process. This paper will outline a definition of the convergence concept, before analyzing the literature of the emergence factors. Then, it describes the convergence models of some Asian latecomers countries to find the determinants that led them to reach this level of growth. Finally, it proposes an alternative model of catch-up for Senegal, taking into account the lessons from the emerging economies and the current Senegalese environment.

Keywords: emergence, Economics, Advanced, convergent

1. Introduction

Today, reduce poverty and catch-up with the developed countries are the collective aspirations of all developing countries even though the pace and pattern of catch up have varied significantly. Only some developing countries, mostly in East Asia, realized the dream by the end of the 20th century. Entering into the 21st century, Brazil, China, India, and many other large developing countries achieved dynamic growth.

The economic and technological catch-up first concerned Western countries and then Asian countries. The first catch-up country was Great Britain by Germany in the nineteenth century, which was studied in detail by Gerschenkron (1962) [18]. The catching up of the United States by the other industrialized countries was then analyzed (Abramovitz (1986) [1], then the Asian experience (Chang (2002) [5], Shin (1996) [33]. These works present the factors explaining the countries take-off, which have made the catch-up, and the failure of those who have fallen behind.

In recent years, the term "emergence" or "catch up" has been used to define what would be the new trajectory of Sub-Saharan Africa. This term has replaced the word "development," which today is entirely "has been." In the twentieth century, sub-Saharan Africa was supposed to develop; in the 21st century, it is supposed to emerge. Thus, out of 54 African countries, 37 have launched a plan to become an "emerging" in the medium term.

Indeed, the Senegalese Government has been committed since 2014, in a new economic and social policy framework reference in the medium and long term through the "Plan Senegal Emergent" (PSE) and with the vision of an "emerging Senegal within 2035, with a society of solidarity and the rule of law ". In this new ambition, industry has been chosen as one of the priority sectors and flagship projects, bringing foreign investment, jobs, and growth.

The purpose of this paper is to describe the convergence models of some Asian latecomers to see how they have done their catch-up process and then propose an alternative model for Senegal. It should be made right clear that there is no single best-emerging market model. In the course of development, each country follows its path based on its human, economic, and natural resources. However, whatever way it takes, most of the emerging market has put industry at the heart of its economy structural transformation.

This paper is organized as follows: the first section defines the concept of economic catch-up. The second section outlines the theoretical background of the study. The third section reviews the catching-up processes case studies of some Asian countries to highlight key features of their model, while the last proposes a catch-up model for Senegal.

2. The concept of emergence or economic catch-up

2.1 What is emergence or economic catch-up?

This concept of emergence is in the news as much economic as geopolitical or media. It, first of all, reflects a discomfort or even a fear of countries dominating the world to see their leadership jostled. The concept of economic emergence came into existence a few years ago when Antoine Van Agtmael first used the term "emerging market" in 1981 at the International Finance Corporation (société Financière Internationale SFI). He used the word emerging markets to refer to developing countries that offered opportunities for investors (Marcel Mbaloula, 2007) [28] by creating an investment fund in developing countries with promising growth (Julien Vercueil, 2011) [23]. Over time, this term includes more countries and, as a result, the two concepts "newly industrialized economies" and "emerging markets" give birth to a new category "emerging economies" or "economic catch-up"

that combine the criteria of the two groups (Thorpe, J., & Prakash-Mani, K. 2003) [35]. It is not easy to define what emergence is. The political scientist Christophe Jaffrelot explains several criteria: a healthy and sustainable economic growth in a developing country, a stable and interventionist state, a desire to participate in world affairs. Countries are emerging economically by focusing on low wages combined with long hours of work in labor-intensive economic sectors. They use and abuse an undervalued currency allowing them to be more offensive to export. This integration into globalization enables them to accumulate foreign exchange reserves and to change the international division of labor for their benefit. Domestic reforms are essential: an agrarian reform that frees energy for the needs of industrialization, a national saving that finances this effort, an economic nationalism that welds a people behind a durable state power.

Economic catch-up can also be defined as the tendency of developing countries to grow faster than the industrialized countries. Still, it concerns more particularly the bringing together of standards of living between countries with the same growth conditions. The catch-up theory suggests that weaker economies will experience a higher rate of growth and get closer to the developed world income levels.

2.2 Evolution of catching-up countries

The successive waves of rapid industrialization in Europe and America spread rapidly in East Asia from the 1960s to the 1970s. They shattered the North-South dichotomy and the very notion of the "Third World." After the Japanese one, the experience of the four dragons still considered too isolated and specific then spread to other countries in the region (Indonesia, Malaysia, Thailand, weaker in the Philippines) before expanding to China, Vietnam, and more recently to India. That is, for the first time in history, the majority - in demographic weight - of the southern population (Godement 1993, Radelet 1997). Below, we would like to describe the evolution of some catching up countries around the world and particularly in Asian countries.

Tigers and dragons from Asia

From the 1980s, the industrial takeoff of East Asian dragons or tigers (South Korea, Taiwan, Hong Kong, Singapore) was booming, and characterized by a stable trading environment with low inflation; prudent fiscal policies; an exchange rate favoring export competitiveness, the development of finance with progressive liberalization; efforts to minimize price distortions; and investment in education and upgrading skills (Yusuf (2001). Their insertion into the global economy is a concomitant of the crisis-change of the 1970s that live in OECD countries [1]. This image of Asian dragons and tigers is indicative of the aggressive nature of their active participation in the global economy and the fear of developed countries. It is the time of the crisis of relocations towards these dynamic countries, which progressively aspire to the low-skilled jobs of rich and developed countries. For example, textile, steel, shipbuilding, and ship repair jobs, to name but a few, are migrating to these countries. The "Asian miracle" is built on export-oriented industrialization with the drawback of the weakness of their domestic market.

2.2.1 The Brics, conquistadors of globalization

The term BRIC first appeared in 2001 in a note from the US bank Goldman Sachs to designate Brazil, Russia, India, and China as rising economic powers called to challenge the domination of rich countries in the global economy. South Africa was able to join the BRIC group in 2011, despite its tiny size compared to those giant countries, thanks to the efforts of the South African business community and the Johannesburg Stock Exchange. The group of four major emerging countries, now five, is BRICS (Brazil, Russia, India, China, South Africa). Jim O'Neill, an economist at Goldman Sachs in 2001, defined the BRIC as the most promising markets on the planet.

These countries are the engines of the world economic growth, of which they account for 50% between 2000 and 2008. For more than ten years, China has been displaying insolent double-digit growth and has been the world's second-largest GDP since 2011. Jim O'Neill estimates that they will account for 40% of global economic growth by 2025. What are their assets? China is a "hypercompetitive-manufacturing exporter" (Alan Beattie, Financial Times), India specializes in IT services, Brazil is a formidable agro-exporter, and Russia is banking on its energy assets. The companies of BRICS new conquistadores of globalization launch to the assault of the world. The Boston Consulting Group (BCG) identifies the new champions in 2007 of the 100 "challengers," 41 are Chinese companies, 20 Indian, 13 Brazilian, and 7 Russian, for a total of 81.

"The US bank Goldman Sachs study showed that the growth of the BRIC, combined with the appreciation of their currency, would lead to a strengthening of their economic weight and a change in the balance of power in the world by 2050" (Cahiers français n ° 357 2010). That study predicted that by this time, the world's largest economies would not be the richest, in terms of per capita income, and that the world scene would be significantly transformed. Since then, the concept of the BRICs has found expression in summits that brought together the four countries in 2009 (in Russia) and 2010 (in Brazil). The BRIC group is finally representative of the more general movement of economic takeoff and international integration that characterizes some of the so-called "developing countries" thirty years ago.

Can the emerging world be reduced to the BRICS and the dragons? Over the past decade, other countries have also emerged as new economic and political actors, giving rise to the creation of further international consultation.

The N11, or group of the following 11, is spotted by J. O'Neil in 2008: Indonesia, Mexico, Turkey, Nigeria, Philippines, Iran, Saudi Arabia, South Africa, Thailand, Vietnam, and Venezuela.

The E7 - the Bric + Mexico + Indonesia + Turkey - are the countries whose total GDP is expected to exceed that of the G7 by 2020, according to a study by Price water house coopers (January 2010).

3. The background of catch-up theories

Over the last twenty years, the economic emergence of some developing countries has attracted the interest of economists. These countries have achieved a high rate of economic growth for a long time. It was necessary to take interest and wonder about the factors that lead to these performances. The review of the

[1] The Organization for Economic Co-operation and Development (OECD) is an international organization of economic studies, grouping 34 member countries with the common point of being democratically governed and entering a market economy.

literature illustrates that these factors are different from one country to another, and the explanations given by economists are different. Their conception of emergence does not find consensus.

Francisco & Roberto (2010) [17] note that the critical factor of economic catch-up is the development of institutions because they contribute to generate the conditions for hyper-competitiveness. They find that the existence of a diversified institutional framework will create different states of competition, which will create different pressures on the competitive advantages of companies.

Trépant Inès (2008) [36] considers that an emerging country is a country that integrates into the global economy and implements major Western-style institutional, political, and legal reforms. He found in a study that, over the period 1995-2005, the growth of merchandise exported was 18% for China, 13% for India, and 10% for Brazil, compared to 4% for the United States. He observes that FDI accounts for 30% of the output of the Chinese private economy and that the manufacturing sector is made up of 63% of foreign capital. Trépant concludes that the emergence of these countries requires risky financial infrastructures as integration into the global economy involves the liberalization of the capital account.

Another author, François Lafargue (2011) [16] pointed out that some countries were enabled to catch-up because of their ability to change their international trade by diversifying their economies and by setting up the world-class companies in several countries of the world. This has led to a higher GDP and faster economic growth. This growth is mainly based on exports of consumer goods in China, the export of agricultural raw materials for Brazil because they represent 30% of exports, and finally, the export of hydrocarbons for Russia.

To emerge, countries must have an industrial platform and also open up to the world economy, which also uses foreign capital if necessary, especially FDI. It is mainly an economy that has developed public companies (Elsa Lafaye de Micheaux 2014) [12]. According to Figuière & Guilhot (2015) [14], the start of the process of economic emergence requires that the country must be influential on the international scene to be the winning party in the negotiations. (Fagerberg, Mowerie, and Nelson (2005) have followed Gerschenkron's pattern and argued that countries that have converged rapidly are those that stimulated their technological congruence by high investment in education and research while accelerating the adoption of technologies through a proactive industrial policy. This policy is based on a set of institutional mechanisms of interventionist and protectionist nature: customs barriers, specific funding channels, and targeting of investments.

All of these attributes raise questions about the factors that led to some developing countries to record very high and sustained growth rates for several years. The literature review on this issue discusses three distinct factors: economic, technological, and institutional factors.

3.1 Economic factors

Generally, economic factors are those that directly generate wealth creation. The economic theory of Robert M. Solow (1956) presents three main factors: capital, labor, and resources. For this study, we will focus on population, resources, and value-added of primary sectors (industry and agriculture).

3.1.1 Labor

Emerging countries have used their large community as a competitive advantage. Countries such as China, India, and Brazil represent a population of 3 billion inhabitants, about 40% of the world's population in 2018. In geopolitical terms, this figure can be compared to the total population of the North Atlantic Treaty Organization (NATO), which is 992 million, or 14% of the world's population. The population is a factor of production, which ensures a qualified and cheap labor force since the demand for labor is superior in this context to the supply. This workforce builds the labor power of a country since the individual is the essential parameter in the construction of an economic model (Tebbani K. & Challal M. 2006).

3.1.2 Natural resources

Natural resources are an essential factor of production and development. Emerging countries have used this asset to achieve rapid growth in manufacturing and increased exports (Hoskossn & al., 2000). Russia was embarking on a growth model based on the shipping of natural resources such as gas, oil, palladium, and gold (Dusan Damnjanovic 2015). Its GDP has almost multiplied by ten during the period 1999-2014. Other countries like China have become the first importers of natural resources and accounts for nearly 50% of world steel consumption and production. On the other hand, raw materials account for 58% of South Africa's total exports, with ores accounting for 25.3%, precious stones 19.2%, and base metals 12.2% (Laurence Daziano, 2014).

3.2.3 The agricultural and the industrial sectors:

The agricultural sector is essential in an economy. Adam Smith (1776) explains that "food is not only the main part of the world's wealth, but its abundance gives value to many other kinds of wealth." Some emerging countries were relying on this sector because their acreage and climate benefits allowed them to diversify their agricultural production. This sector had played a vital role in the growth of South Africa in exporting agricultural products and absorbing the majority of the inactive population (Jan C Greyling, 2012). The value-added of its agrarian sector increased from -7.13 to 6.85 during the period 1990-2014 (World Bank, WDI). In the 1980s, Brazil distinguished itself as an agro-exporter and reached an agro-food trade surplus of more than $ 28 million in 2005 (Albert Massot Marti, 2008). Thus, the evolution of its GDP is accompanied by a change in the value-added of its agricultural sector. Brazil's value-added growth in agriculture rose from 0.98 in 2003 to 8.36 in 2013 (World Bank, WDI).

Other emerging countries have built their economic models in the industrial sector. China's emergence model has been developed by the manufacturing sector, making Chinese products more competitive. Its success is due, in the first place, to lower production costs. China has managed to transform this sector to integrate the global economy (Fauzi Hussin, Chee Wuan Ching, 2013). He came to specialize in high technology since exports of high-tech products increased from 6.43% of total exports to 30.84% in 2006 and then fell to 25.75% in 2016 (World Bank, WDI), which explains the shift of the Chinese population to consumption.

3.2 Institutional factors

Institutional factors can also explain the economic performance

of the BRICS countries. According to Rodrik (2003), institutions are the reason why one country is more precious than another. They are a primary condition and the key to development. He notes that a successful institution is an institution that preserves property rights, helps to respect contracts, stimulates entrepreneurship, promotes integration into the global economy, also helps manage financial risks and maintain stability macroeconomic (Rodrik, 2008).

Daron & al. (2005) argue that institutions are important actors in society because they affect economic growth through investment in human capital, the organization of production, technology, or cultural and cultural factors. North (1991) defines institutions as the rules of the game in society. This is the set of formal and informal rules that describe behavior between individuals. Regulations are imposed on actors, and they guide the game. Therefore, to survive, organizations have to live up to the expectations of institutions that are the product of ideas, values, and beliefs (Greenwood & Hingings, 1996).

The massive flows of capital can observe the contribution of these factors to the growth of emerging countries. Eichengreen, Hausmann & Panizza (2002) argue that investors may be reluctant to invest their capital in countries where institutions designed to enforce their claims are weak and where there is a significant risk of debt repudiation.

3.3 Technological catch-up factors

The technological factors contributing to economic catch-up has been proposed by the World Bank, in its report on the World outlook devoted to the diffusion of technologies in developing countries (World Bank, 2008). According to this report, the factors contributing to the distribution of technologies depend on the economy's technological absorption capacity, and the existence of transmission channels. These are based on openness to international exchange and foreign direct investment. The diaspora influence is also crucial in this process of technology transfer. Technology host countries also need to have functional technology absorption capacity, which in turn depends on governance and a business-friendly climate ('pro-business') and ' proactive " policies. They also require proper basic technical training and sources of financing for innovative companies. Finally, investment policies in national education and infrastructure need to be privileged.

To summarize, all the factors involved in the industrialization strategies concern:

- The technological capabilities of individuals and companies, which directly affect their ability to learn technologies.
- The economic signals they face,
- Their capacity to interact with each other and with institutions that are not directly market-oriented, such as public agencies, teaching, and research institutions.

Each country that has succeeded, or has begun a catch-up process, has created an environment conducive to industrialization in these three dimensions, with varying modalities and levels of intervention.

4. Lessons from Asian Catch-up countries models: some case studies

4.1 The catching-up model of Japan

During the Meiji Restoration, Japan chose the German industry, as a benchmark at a time when it's per capita income was about 40% of that of Germany. For Japan, it was more realistic to try to catch up with Germany than Britain. Many nations have struggled to catch up, but Japan's success was because it had chosen the right target.

Starting with an income level, which was only one-third of the West in the 1850s, Japan has done rapid catch-up in 50 years to become the first industrial country in Asia by 1904. After opening-up trade in 1854, the Japanese government motivated learning from Western institutions and technology by sending high level missions, including about half of the ministers to America and Europe for nearly two years (Shimposha, 2000)[2].

The success of the Japanese economy is mainly due to the choice of a sound industrial strategy. The industrial policy model has adapted to Japan's growth pattern: the post-war reconstruction period to 1960, the era of rapid growth to the first oil shock, and the crisis until the economic slowdown in the 1990s.

After 1952, industrial policy focused on the reconstruction and expansion of mass production industries. The government has favored the sectors of steel, shipbuilding, automobiles, and aluminum refining to stimulate economic growth as part of a national policy of "revitalization or self-esteem" World Bank (1993). With rare natural resources and a large population, industrial policy architects decided that Japan should promote the industrial sector that would be competitive in world markets. Komiya, Okuno, and Suzumura (1988) pointed out that this neo-mercantilist logic prevailed in the face of neoclassical logic during the period of reconstruction.

During the era of rapid growth in the late 1950s, the government stepped in to strengthen the international competitiveness of Japanese society. In the early 1960s, the development model "in-flight of wild geese" (Japan being the leader) proposed in the 1920s by Japanese economists, in a context of colonial expansion, was taken over by Akamatsu. In the 1970s, the government promoted development in knowledge-intensive sectors such as electronics and semiconductors. Concretely, during these decades, Japan is still pioneering in R & D.

The instruments served by the industrial policy have made a planned state economy of the post-war years a market economy, which favors Japan's gradual integration into the international economic system. The government has done different modes of intervention: subsidized credit and tax incentives, trade protection, R & D incentives, and direct subsidies for the purchase of foreign technology, barriers to entry and competition regulation, and the combination of administrative consultation and coordination mechanisms (Noland and Pack (2003)

Japan, did not receive any direct investment at that time. Factory construction in the early Meiji period was mainly financed from private capital, domestic savings, or joint-stock companies or achieved through public works. The country adopted technology from abroad enthusiastically, but funding, for the most part, was self-generated Shimposa (2000).

In the 1950s and 1960s, Japan imported many technologies, including automobiles, machine tools, and other heavy industries. Until 1988, Japan was the world's largest importer of technology

[2] Toyo Keizai Shimposha, 2000. Chapter 5 in ―Globalization of Developing Countries: Is Autonomous Development Possible? (Tojokoku no Globalization: Jiritsutechi Hatten wa Kanoka). The book won the Suntory Prize for Social Sciences and Humanities and the Osaragi Jiro Award for Critical

(Odagiri and Goto, 1993). From the 1960s, as the Japanese economy overgrew and faced increased competition from US and European firms, private firms began to invest more in in-house research and development.

Japan was not only faster than other countries in terms of speed of adoption, but also in terms of improving this technology. This feature incremental process innovation has finally become an essential skill that has allowed them to compete successfully with established companies in developed countries. They have invested too much in the process of catching-up in reverse engineering and internal R & D, and have invested in the innovation of the production process. Not only have they learned and mastered imported technologies rapidly, but they have also made efforts constant to improve the efficiency of their plants (Odagiri and Goto, 1993).

In today's industrial policy debate, Japan plays the role of the benchmark. However, many of the industrial policy measures used by the Japanese government until 1990 were not different from the ones used by other governments. And we are not talking about countries like Korea, Taiwan, and China, which emulated Japanese industrial policy to one degree or another. Still, we are talking about most of other developed countries today, including Britain (between the mid-18th to the mid-19th century), the US (between the mid-19th and the mid-20th century), Germany (in the late 19th and the early 20th century), and post-WWII France (see Chang, 2002, for further details) [1].

4.2 The catch-up model of South Korea

Since 1960, the economic development of South Korea is one of the biggest success stories in the history of evolution. In just a few decades, it was transformed from an agrarian to an industrialized society exporting high technology products such as TVs, cars, mobile phones, or computers.

During the Korean War (1950-53), which devastated the peninsula, Korea relied heavily on US aid. Most of the industrial infrastructure established during the Japanese colonization was in the North (or Republic of Korea). However, Korea benefited from a high level of human capital, which multiplied in the following decades thanks to government investments in education and the implementation of the right industrial strategies.

In the early 1960s, after a series of political turmoil, the new South Korean government launched its five-year economic development plan. To promote the growth of export-oriented, labor-intensive industries, this government has allocated financial flows and tax benefits to companies engaging in export activities, while applying tight control on imports.

Historically, the "General Park" regime in the 1960s initiated reforms to promote export, but this strategy was not to change the composition of exports. At the end of the 1960s, the Korean government enacted extensive legislation on heavy industries and manufacturing. The laws promoting the manufacture of industrial machinery and shipbuilding of 1967, the electrical sector of 1969, the iron and steel industry of 1970, and the petrochemical industry of 1970 demonstrated its commitments to the development of these sectors. Similarly, a program of support to heavy and chemical industries (HCI) was formally launched in 1973 and was extended until the late 1970s. The government has directed significant financial resources and tax benefits to this industry, marginalizing light manufacturing industries with high labor intensity. He encouraged a handful of companies that had worked well in the first five-year economic development plan.

Amsden (1989) described the Korean government's use of trade protection, selective subsidies; export targets (for individual companies), nationalization of the banking sector, export subsidies, and control prices. All these measures have been deployed to develop technological capabilities and build industries that will ultimately compete in global markets. A vital element of the strategy was that in return for government subsidies and trade protection, the government required recipients to meet stringent performance standards (Amsden). On the other hand, obtaining the objectives set by the State in particular by reaching their export targets thanks to the subsidies received has rewarded some.

Remember that in the 1980s, the priority of the government changed and turned to the development of high-tech exports. The so-called rationalization programs have introduced specific clauses (sunset clauses) to ensure the promotion of infant industries and facilitate the closure of declining industries (Chang 1994). This resulted in an increase of more than 30% in exports of high-tech products in the 2000s.

The instruments operated by Korea were similar to those used in Japan. During the export promotion period, the focus was mostly on export performance. Companies that achieved their export objectives were treated more favorably. They benefited from the exemption from import taxes, tax incentives, and preferential access to capital. Nevertheless, price controls were maintained until 1973, and the state-banking sector provided credit to the private sectors according to government priorities.

4.3 The Chinese model of catch-up

The China's rapid economic growth since the beginning of the policy of reform and openness in 1978 has been a source of interest as well as apprehension for other countries in the world (Harris 2003, Sutter 2003-2004). Several argue that China will catch up with the United States shortly (World Bank 1997, Maddison 1998, Morrison 1998). Indeed, with the financial and economic crisis that has been raging since 2008, Goldman Sachs predicted that "the Chinese economy could overtake the US economy as the largest economy in the world in 2027". But their prediction three years ago was: "It is unlikely that China will become number one before 2040" (Leonhardt 2008). More optimistic about China's development, a report by Price water house Coopers suggests: "China could become the world's largest economy by 2020 and it is likely to become more advanced than the United States by 2030" (Price water house Coopers 2010).

The Chinese model of development can be seen primarily as a gradual, experimental, and simultaneous process of industrialization, under the direction of the state that preserves the market. This is a method of economic liberalization without political liberalization. Industrialization is propelled by capital (foreign investment and domestic savings), labor, and technology. Marketization is introduced by the creation of a market outside the state plan and by a dual-track price system without complete privatization. And globalization is achieved through an export orientation strategy.

Despite significant advances, the achievements of the Chinese industry during the plan era fell far short of potential. The most obvious indicator is slow productivity growth (World Bank, 1985, p. 110; Chen *et al*., 1988) despite a long list of favorable

circumstances: unprecedented official promotion of industrial development, large inflows of Soviet technology and capital goods, considerable increases in public expenditure on R&D, basic health care, and rapid expansion of primary education.

Beginning with a low level of technological capability, Chinese firms (led by the government) invested heavily in reverse engineering and technology imports in their strategic development. In these industries, which China used technology imports to develop, the efforts of the government were disappointed by a recurring pattern of "lag, import, lag again, import again." Three factors seem to lead to this outcome: firstly, there was a gap between technology users and technology creators. Between 1978 and the mid-1990s, industrial policy was focused on three main priorities: the formation of large national industrial groups, the assimilation of technologies imported from abroad, and the reform of the national research and development system (R & D). The content and objectives of this policy indicate an evolution compared to the previous period, marked by the aberrations of Maoism. Until the 1980s, the large state-owned enterprises (SOEs) were the primary technology users, but they had no incentive to master the manufacturing technology to innovate. Secondly, Chinese enterprises spent little money on assimilating the imported technology. They did not have a laboratory system similar to the R&D lab system of Japanese firms, which undertaken quality control activities and would improve or create new processes. Thirdly, some Chinese enterprises did try to invest in internal R&D activities following technology imports to master and learn the imported technology; their efforts were too little, especially compared to Japan and Korea. Yet in 2005, the ratio of R&D to sales in midsize and large companies remains below 1%, lower than in developed countries, even though it has been increasing steadily since 1997.

Using Freeman's term, China also has a "window of opportunity," which was different from that of previous latecomer countries. If Korea and Japan's catch-up model is a closed one, the Chinese model is an open one with two specific features: firstly, modular production enables low cost, global competition, and high product variety. A module is a subset of a product's function structure where the interfaces are standardized and the interdependencies between the modules are minimized as much as possible. Modular products may be components, assemblies, or machines that accomplish a global function through the combination of distinct building blocks or modules (Chen and Liu, 2005). When the implication of modularization for innovation, companies in developing countries, whether they are suppliers or assemblers, can enter the innovation competition more easily than before. They may not be good at technological innovation, but they can excel and succeed commercially by sourcing modules and assembling them. A necessary condition for firms attempting to catch-up and compete based on this industry structure is that they have access to the needed technologies and modular packages in their domestic context (LIU, 2005). Secondly, concerning the globalization of technology, Chinese companies use international technology outsourcing to make quick product innovations. The globalization of technology can be either a further burden or a window of opportunity, depending on whether the firm playing catch-up has made the technological effort to support the mastery, adaptation, absorption, and improvement of technology or not (Archibuchi, 2003). These are the basis for Chinese firms to catch-up and distinguish their model from that of Japan, Korea, and other latecomers (LIU 2005).

Table 1: The comparison of Japanese and Chinese catching up model

Japanese Catching up model	Chinese catching up model
Technology importation is significant	
FDI and the effect of globalization of technology are limited	FDI and spillover are welcome, and globalization of technology is permeating
In-house R&D is most important	Partnership with outside technology supplier is most important
Integration of R&D, manufacturing and marketing within firms	Modularization
Training and skill accumulation is necessary for mastering the technology	Outsourcing technology and market niche needs is important
Industries with the integration of the manufacturing process, like the automobile, machine tool industries	Industries are dis-integrated, but with modularization: electronics
Result: incremental processing innovation	Market-oriented incremental product innovation

***Source*:** Van-ha NGUYEN 2010

Product innovation based on international technology sourcing of China is very different from the innovation that is the basis for Japanese firms' competitiveness in manufacturing industries. According to Prof. Fujimoto, there are two basic architectural types in manufacturing: modular architecture and integral architecture. In modular architecture, the modality of interaction among components is standardized for a secure connection. For example, desktop computers are a typical modular product in which globally standard elements from various companies are freely combined. By contrast, in integral architecture, the complexity of interaction is accepted, and improvements are achieved through numerous trials and errors. For example, automobiles must be manufactured with fundamental architecture if multiple objectives such as performance, comfort, fuel efficiency, safety, etc. are to be attained simultaneously. Generally, modular architecture is suitable for obtaining quick results at low cost, while integral architecture is appropriate for the pursuit of ever-higher quality for a long time.

The catch-up experience for these examples of countries studied above showed some prerequisites that developing countries need to converge, such as more access to FDI, use of comparative advantage, access and transfer of new technology, Population flows, and a crucial role of countries government.

5. A model for African sub-Saharan countries: Senegal as example

In the 1950s and 1960s, Asian countries such as South Korea or Taiwan had levels of development almost similar to those of African countries like Ghana, Senegal, or Nigeria. The following decades saw the "dragons" of Asia started a forced march of economic catching-up process of the developed world, while these African countries have remained behind.

The development of Africa has not been without serious problems. In the absence of sufficient agricultural investment, food imports increased, and export earnings do not rise fast enough to cover the cost of industrial inputs required. Industrialization has been disappointing because it has not been

able to absorb the workers attracted in large numbers to urban areas, and its contribution to development has been low outside major cities. But Jean-Claude Berthélemy and Ludvig Söderling (2000) argue that even though sub-Saharan Africa as a whole cannot yet be considered as a serious candidate for economic emergence, there is an assumption according to lack a limited number of African countries could embark on this path in the next twenty years. In this case, if the circumstances lend themselves to it, this economic progress could reach the rest of the continent. For the Senegalese economist Mamadou Moustapha Kassé in his book "The industrialization of Africa is possible: what model for Senegal?" Africa is introduced into the global economic game through the geostrategic of raw materials. By comparing bringing the continent's economic, financial, and technological interests to those of the major emerging countries, it is possible to build or rebuild competitive industrial policies. Today, the conditions are met; there is time for the action of public management in close collaboration with the private sector. Besides, the international system is favorable to the industrialization and growth of the continent. According to him, the continent currently has all the assets to succeed; it has the raw materials, the financial means, the institutional means, and the necessary knowledge.

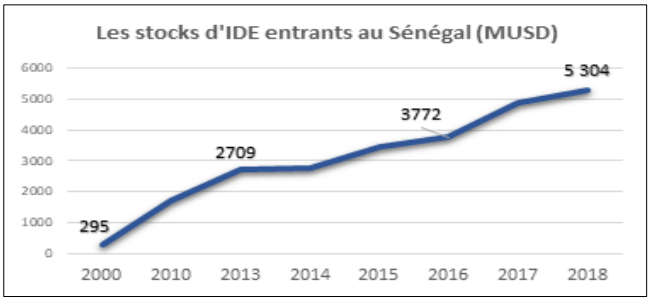
In the case of Senegal, his Minister of Industry and Mines believes that it can succeed in its development. He asserts, with the revival of major industries, the policy of upgrading SMEs, the endogenous development initiatives, and the accelerating costs, the industrial sector will be an engine of growth, jobs, and exports over the next ten years. Industry and mining will make up 25% of GDP training through PSE.

5.1 Strategy to Attract More FDI in Senegal

Since 1990, foreign direct investment (FDI) has been the largest of all international capital flows to middle-income developing countries. In the 1960s and 1970s, many developing countries were suspicious of FDI and often took steps to discourage it. At the time, because of the recent colonial history in many countries and the sometimes-offensive behavior of certain foreign investors in taking advantage of weak political and legal systems to gain monopoly rights and make big profits, this suspicion often well was founded. Starting in the mid-1980s, these attitudes began to change, and developing countries increasingly sought to attract FDI as a mean of financing investment, creating jobs, and importing technology and ideas.

FDI is relatively small compared to domestic investment. Still, according to the "World Investment Report," its share has grown in the last two decades: it accounted for over 10 percent of all investments in developing countries in 2003 compared to about 2 percent in 1990.

Indeed, Senegal hosts a large stock of FDI compared to the rest of the region, mainly of French origin. Senegal ranks tenth among African countries that attract the most foreign direct investment (FDI), according to the 2018 Africa Investment Index. The government has an active policy to encourage FDI inflows. According to the 2018 UNCTAD Investment Report, FDI in Senegal has grown from USD 276 million in 2012 to USD 532 million in 2017. Total FDI stock was USD 4.8 billion (31.5% of GDP) at the end of 2017. Among the leading investors in the country are France, Morocco, Indonesia, and the United States. Foreign Direct Investments grew significantly between 2000 and 2018.



***Source*:** UNCTAD database, 2018

Fig 1: Total FDI flows from 2000 to 2018 in millions of USD

Senegal ranks 141st out of 190 countries in the World Bank's Doing Business 2019 report, a drop of one percent from the previous year. Under the Business Climate and Competitiveness Reform Program, visible improvements have been made in the business creation and contract enforcement process. The new exclusive economic zone should stimulate investment. The government accepts foreign investment, but potential investors face obstacles, including regulations fairly transparent and high factor costs. There is no legal discrimination against foreign-owned or operated companies, and there are no barriers to full ownership by foreign investors in most sectors. Senegal's strengths include competitive production costs, a skilled workforce, strategic geographic location, excellent international and regional political relations, and a competitive economy.

To appreciate the efficiency of the investment, the Incremental Capital Output Ratio (ICOR) is often used. It is the marginal coefficient of capital obtained by the ratio between the annual investment and the annual change in GDP. A high ICOR value is therefore not desirable, as it reflects a small change in production despite an increase in investment. In other words, it would indicate inefficiency in investment efforts. According to Vanek and Studenmund (1968), the desirable level of ICOR for developing countries is around 3. An ICOR above three, therefore, reflects inefficient investment. The table below presents the situation in WAEMU countries.

Table 2: Incremental Capital Output Ratio (ICOR) between 1981-2014

Benign	Burkina Faso	Ivory coast	Guinea Bissau	Mali	Niger	Senegal	Togo	WAEMU
4,7	4,2	5,9	6,5	5,9	8,2	6,5	5,6	5,8

***Source*:** World Bank, taken over by Soumaila (2014)

This table shows the lack of efficiency of investments in all countries of the West African Economic and Monetary Union (UEMOA). Indeed, the values of the coefficient are higher than the critical value for all countries. The average value of the ICOR is 5.8. It appears that Senegal (with 6.5) is one of the countries where the efficiency of investment is less important.

FDI is of crucial importance to the economy of a developing country like Senegal. They are valued because of their sustainable characteristics and their relatively more significant growth-training effects than any other type of investment. Perceived as a critical vector in the economic development process, FDIs reward the economy with several positive results. We can quote the increase in the level of private capital stock, the stimulation of competitiveness in the local market, the creation of jobs, and

improvement of the stock of knowledge by providing new equipment and transferring know-how.

As Daniel Sessi recalls in a brilliant analysis for "Africa of Ideas, [3] the African continent can attract FDI not only based on its resources and its local market, but also by improving the business environment [4]. This analysis is widely shared by the majority of economists and experts in the field [5].

The ambivalence and efficiency towards FDI required the definition of a global and shared strategy for improving the attractiveness of Senegal. Various key factors of success can be apprehended, such as operational and robust governance, a vision, relevant territorial marketing, and investment agency, etc.

5.2 Industrial Strategies for Catching Up Process of Senegal

Along with access to the latest technology, institutional imitation, qualified labor force, and innovation are also necessary. For example, the US was able to learn the "scientific spirit" and support for technical invention from England. Therefore, a more indigenous set of values and systems was added, leading to the capital-intensive, labor saving, and standardized production system, by which America could exploit its abundant natural resources and large domestic market (Abramovitz and David, 1994) [2]. From the very beginning, American inventors modified and reshaped technologies of England to suit American circumstances. By the end of the 19th century, American engineers and scientists were by themselves, even more, productive than those in Britain, developing new processes and products in most industries. Technological advances sometimes come from the study of other countries, as shown by the example of India and semiconductors. The Indian diaspora that joined Silicon Valley has gained knowledge that it has brought back to its land to develop India's electronics sector, which is today well growing.

Furthermore, the examples of the recently successful catch-up process are based on the existence of cross-border population flows. These flows concern both citizens of the country emigrating to study in industrialized countries, and returning home and qualified people from other countries who come as advisors or experts in the country in catch-up. For example, it was British technicians who brought textile production techniques to the United States in the 19th century. The Japanese industry also developed under the impetus of technical advisors from abroad, while the Japanese returned home after studying Western methods. These cross-border movements of skilled labor have also intensified thanks to the action of businesses and universities. Multinational companies have played an increasing role in this transnational learning process. Thus, new Japanese automotive and electrical construction companies established close relationships with companies in the United States and Europe during the post-war period. Singapore's development has also been led mainly by subsidiaries of multinational companies, while Korean and Taiwanese companies have acquired their expertise by working for American and Japanese companies. Senegal would be able to put in place an excellent policy to learn this skilled labor and to deal with the phenomenon of brain drain. Senegal could also learn from the Japanese's integral manufacturing. It should try to become a reliable developing country partner in high-quality manufacturing with Japan and other developed countries, which are integral producers. It is a sincere attitude toward production with pride, skill, and dedication, and a way to achieve high performance regarding long-term profit. Japan is a country of integral manufacturing with high technology, high wages, and an aged population, looking for a developing country partner. The fact is that integral manufacturing cannot fully develop by just using simple labor in developing countries. Therefore, Japan needs a young and developing country as a reliable partner in integral manufacturing. Senegal can also learn from China with its rapid expansion of manufacturing capacity. China has a large number of managers, scientists, engineers, and unskilled workers, ample industrial materials, a relatively high level of technology backed by a long history of industrialization drive, and a dense network of overseas Chinese businesses. Senegal can form a production partnership with China and use low-cost Chinese inputs to its advantage. The proper positioning requires a clear understanding of the fields in which China excels and the areas in which it does not.

Senegal must also rely on sub-regional and continental integration with other African countries to get out of the narrowness of domestic markets. The Senegalese Professor Demba Moussa Dembélé "assumes that the issue of industrialization must be at the heart of the agenda of the African Union and the different sub-regions of the continent. However, given the considerable changes in the international environment, the chances of success of this industrialization can only be envisaged in a sub-regional or continental context ". It will, therefore, be necessary to build on strategic partnerships by using geographical proximity between the continent and its neighboring markets to encourage co-production operations and develop local industry."

However, Senegal possesses some country-specific advantages, such as easy access to the Atlantic Ocean, the relative proximity of affluent markets (EU and USA), or availability of critical inputs for production (cotton, leather). Besides, Senegalese exporters do not suffer from significant trade barriers, thanks to preferential trade agreements (most notably the Everything But Arms initiative and African Growth and Opportunity Act). Senegal is also an Economic Community of West African States (ECOWAS) member state.

Nevertheless, as Lin and Monga (2011) [25] argue, a developing country can only achieve dynamic growth for several decades and catch-up by developing industries that are aligned with its comparative advantage and exploiting the latecomer power in the process of industrial upgrading. Justin Yifu Lin and all in a recent study (Leading Dragon Phenomenon: New Opportunities for Catch-up in Low-Income Countries) showed show that since the eighteenth century, all countries that have successfully industrialized in Europe, North America and East Asia have two characteristics in common. They have exploited their comparative advantage, and they took advantage of the

[3] AFRICA: Attraction of Foreign Direct Investments - on http://terangaweb.com/africa-attraction-investment- direct-foreigners /

[4] Morisset, J. (2000), "Foreign Direct Investment in Africa: Policies Also Matter," Transnational Corporations 9 (2): 107-25

[5] See the World Investment Report (UNCTAD) - http://unctad.org/en/PublicationsLibrary/wir2013overview_en.pdf

newcomers' strength to mimic the way the more prosperous countries did their industrial modernization.

If Senegal utilizes FDI as a force to drive its economy, it must identify those industries with great potential in its economy (industries with huge Comparative advantage).

Using the concept of revealed comparative advantage, we identify productive industries and industries with great advantage in the slow-growing economy of Senegal. The benchmark for revealed comparative advantages (RCAs) is the value 1.

Table 3: Competitiveness of manufacturing activities (RCA - Senegal) in 2000 – 2016

	2000	**2004**	**2008**	**2012**	**2016**
Natural resources: agro	2,655	1,526	1,259	1,591	1,548
Natural resources: others	2,633	4,026	4,971	3,153	3,482
Low technology: textiles, clothing and footwear	0,173	0,171	0,181	0,170	0,128
Low technology: other products	0,433	0,394	0,511	0,535	0,527
Medium technology: automobile	0,031	0,065	0,111	0,148	0,078
Medium technology: processes	0,988	1,439	0,722	0,535	0,648
Medium technology: engineering	0,114	0,129	0,182	0,195	0,137
High technology: electronic and electrical	0,071	0,042	0,061	0,065	0,041
High technology: others	0,208	0,259	0,244	0,138	0,093

***Source*:** Authors' calculations from UNCTAD

This table shows that only natural resource-based manufactured products have RCAs above the reference value. This result highlights Senegal's advantage in the production of agro-manufactured products and other natural resource-based manufactured products such as the chemical industry sector and the cement sector, gas products, etc. These conclusions confirm the results of the study on the comparative advantage, economic structure, and growth: The case of Senegal Jiri Sejkora and Ondrej Sankot (2017). Indeed, using the concept of RCA, the results indicate that Senegalese production and exports are mostly concentrated in industries related to chemicals (e.g., inorganic chemical elements, perfumery, insecticides, soaps, etc.) and manufactured goods (e.g., lime, mines, cement, and fabricated construction materials). Senegal cannot generally export manufactured products with high value-added. To promote industrialization and growth, Senegal should focus predominantly on the industries mentioned above, where the economy currently enjoys RCA.

Senegal should also capitalize on its natural resources to create new value-added activities through strategic partnerships with key players. We think about developing its mining sector, oil, and gas, which can become the driving sectors of the Senegalese economy.

The modern mining history of Senegal dates to the 1940s and 1950s with the opening of the two large phosphate mines of Taiba and Lam-Lam in the region of Thies, 70km from the capital city, Dakar. These significant phosphate deposits secured the success of the Senegalese economy for several decades. The Senegalese sedimentary basin is also rich in other minerals, including zircon, ilmenite, titanium, limestone, attapulgite, peat, and natural gas. The basement rocks in Kedougou in the southeastern part of Senegal (at the crossroads between the West African countries) contain valuable deposits of gold (Sabodala, Niakifiri, Massawa, Goulouma, Masato and Niamia, for example), iron ore, marble, plus significant uranium, copper and chromium occurrences, making this province an essential area for exploration.

Furthermore, Senegal has also to explore the sector of gas and oil recently discovered.

Senegal has interested in oil and gas for over 60 years. But it is only in the last five years that it has come to the fore as a potential world-class hydrocarbon basin. In 2014, Cairn Energy and its partners drilled many wells in the SNE field in the south. In the north, Kosmos has discovered vast gas reserves that straddle the northern Senegal-Mauritania border and. These recent discoveries will be exploited from 2020 to predict optimistic projection for the overall industrial sector. Senegal's oil and gas discoveries have the potential to transform the country radically. These successful explorations in the country have put a glow on the legal regime for oil and gas and the relevance of the regulatory framework to support the significant scale investment that such discoveries will require. Senegal's energy sector has recently got a massive boost after US and UK companies announced the findings of oil and gas off its coast. Senegal has been able to develop and become the region's number one business hub. Now it could turn into the new energy hotspot of the continent thanks to the new offshore discoveries. Its real challenge, however, will be to avoid the so-called resource curse, which has tormented several African states rich in natural resources.

Based on the analysis above, we propose that Senegal can learn to leverage its comparative advantage industries, attract more FDI, and encourage technology spillovers and innovation through the following strategies:

- Make the country more attractive to promote FDI

The country should be made more attractive concerning FDI. Today, in the context of free trade, small external openings such as free trade and investment are no longer sufficient to attract large flows of FDI. The Senegalese government should work in cooperation with foreign investors, listen carefully to their needs, set agreed targets for technical transfer and procurement in the internal market, design coherent support policies, and so on. At the same time, Senegal would also benefit from improving the legal system, including foreign investment law, streamlining licensing procedures, and stabilizing rules and regulations for foreign investors.

- Promote a better investment

The aim is to make industrial decentralization real by increasing public investment in the territories, promoting areas of industrial specialty with the comparative advantages of the regions, and making the installation of the industrial platforms planned in the first phase of the PSE a reality. Indeed, the PSE has announced the establishment of industrial platforms, including the Diamniadio Special Economic Zone, which should be a multifunctional platform for most income-generating activities (industry, crafts, clothing, equipment, infrastructure, etc.). It is part of the desire to encourage companies to relocate and diversify their businesses out of capital and attract new investors. Public investment is a significant determinant of private investment. The State of Senegal has made a lot of effort in the development of management structures and support for the industry sector (DEPME, FONSIS, FONGIP, BNDE, APROSI, etc.). However, the diagnosis shows that the knowledge and accessibility of these structures are quite problematic for many

companies and industries. For this reason, strengthening the dynamism of these structures is a strong recommendation.

- Promote a better trade for the industrial sector

This is to promote a policy of protection of infant industries, promote the export of manufactured products to Medium and High Value Added. Senegal should use targeted strategies to create superior localization benefits and reduce the costs of doing business. To achieve this goal, it must improve its skills (production management, marketing, engineering), its infrastructure, its support institutions, efficient public services, and good governance of industrial parks and industrial free zones. The national private sector plays an essential role in the transfer of new technologies and skills. This is why policies strengthening domestic private enterprises and links between foreign and domestic sectors are encouraged.

- Improve the business environment

Also, it will be necessary to reduce the tax burden for businesses and simplify tax procedures; promote the formalization of companies; continue and deepen the reforms initiated under the PREAC.

- Strengthen human capital (through a diversified training offer)

The emphasis should be on promoting human capital, which is an important element of productivity. This implies the existence of an educational system capable of providing human resources that meet the requirements of the labor market. Strengthening social capital, through a diversified training offer, a better quality of education and training, and a better training-employment match is crucial in the competitiveness of the industry sector.

Senegal would also benefit from reinventing its educational system so that it becomes capable of continually adapting to changes in the world and developments in the international environment. Senegal is endowed with a very young population and should adopt the approach of a nation keen to garner its demographic dividends by emphasizing relevant education and training. To do this, it must be free from an educational framework in which cohorts of students are directed to universities each year to take courses, many of which have no impact on the current needs of the labor market or the imperatives of competitiveness of the country's economy. The current education system needs to be coordinated with strategies to give pride of place to the needs of the business. The vocational training system needs to be re-evaluated, with reforms that dispel the "myth of the university".

- Facilitate access to credit for businesses, including long-term loans

Access to credit is problematic, and loans granted to enterprises are for the majority of short-term credits that do not allow structuring investments. Facilitating access to credit is thus crucial in improving the competitiveness of the industry sector.

- Promote research development and technological innovation

Promoting research and development and innovation is essential for the continuous adaptation of the needs of the market and the supply of businesses, but also the increase in productivity levels. It is, therefore, essential for industrial competitiveness. A competitive and sustainable industry is fundamentally based on technology and innovation. Which levers mostly contribute to the transformation by an added-value. It appears that 80% of exports in the world are made up of manufacturing products. This is why Senegal must respond to technology and innovation. But to do this, we must remove among other weaknesses of the Senegalese technological system that are lack of funds to finance innovation, very high costs of innovation, very high perceived economic risks, organizational rigidities, lack of information on technology, rigidities of rules and standards. It is also necessary for the field of technological innovation to improve the industrial and managerial skills of small entrepreneurs and artisans (process, management, marketing organization), strengthen the capacities of SMEs / SMIs for better exploitation of industrial property and also create a Center of Excellence for Science, Technology, and Industry.

- Solving the vital issue of energy and infrastructure

The Energy Sector is significant support for the development of the economy, the reduction of social and territorial inequalities. That's why Senegal should improve infrastructure, more particularly the improvement of electricity supply. The main problem is that the energy sector is independently low, which is the main impediment to industrial growth. For its Emergence policy, Senegal will have to guarantee broad and reliable access to cheap energy. It must also provide for the security of property and infrastructure. Improving the supply and the financial performance of Senegalese Electricity Company (SENELEC) are likely to be a central issue. Privatization might be a possible solution, which is attractive to investors. But the increase in private equity in the infrastructure sector has emerged as a result of several factors, including the desire to attract foreign investors. This strategy has had considerable success in the transportation sector and has not produced the expected results. The reasons need to be analyzed before undertaking further privatization.

- Build partnerships and reduce information gaps

Global value chains represent the current trend for multinationals. Senegal should take advantage of international experience and cooperate with international organizations to promote industrial linkages between local firms and multinationals. Experience from other countries shows that successes in promoting ties are rooted in the government's rapid responses to changing business climate (Japan), supporting leading companies (Korea, Taiwan), or technical and financial support from governments (Japan and Taiwan). The government should also take advantage of information technology to reduce information and perception gaps between local businesses and foreign companies. Finally, to meet current needs and catch up with developed countries, industrial policies must form industrial societies in parallel with knowledge societies. This means that policies must not only aim to reduce costs and improve the quality of industrial infrastructure but must also maintain an environment conducive to innovation based on a network of companies, universities, and research organizations research.

Conclusion

The main objective of this paper is to describe the convergence models of some Asian latecomer countries in order to find the determinants that led them reach this level of growth and then propose an alternative model of catch-up for Senegal. The promotion of FDI, innovation, and countries partnership are the way we propose for Senegal to catch-up. This will enable

Senegalese companies and the country as well to connect with the broader global economy and take advantage of strategies such as new technologies, skills, and knowledge. From that Senegal will enable to achieve the strategic goal of industrial catch-up. We will also advocate the development of Senegal's comparative advantages but also the sector of mines, gas, and oil as well.

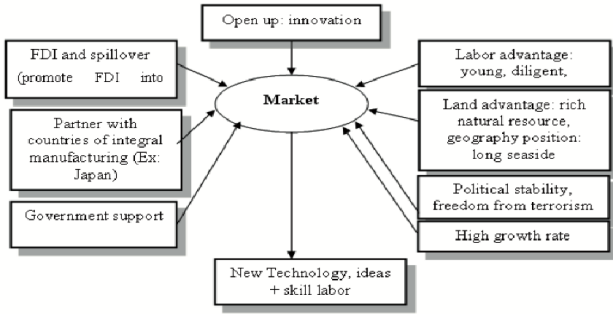


Fig 2: A Proposed model for Senegal's catching-up process

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